DOCUMENT RESUME

ED 440 894 SO 030 832

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TITLE A Right Brain Drawing Study.
PUB DATE 1998-12-00
NOTE 61p.; M.A. Thesis, Salem-Teikyo University.
PUB TYPE Dissertations/Theses - Masters Theses (042)
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Art Education; *Brain Hemisphere Functions; Childrens Art; Classroom Research; *Freehand Drawing; Grade 6; Intermediate Grades; Student Improvement
IDENTIFIERS T Test

ABSTRACT

This study was done to see if sixth grade students could improve their drawing abilities by looking at lines more abstractly--by drawing a picture viewing the original upside down and comparing it to the same student's drawing done viewing the original right side up. Pairs of works were scored on the basis of line quality, proportion, and likeness to the original. The paired t-test revealed no significant effect on drawing ability when students used the upside down drawing technique as opposed to the traditional right side up approach. Appended are 14 figures. Contains 2 tables, 3 graphs, and 24 references. (Author/BT)

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ED 440 894

A RIGHT BRAIN DRAWING STUDY

A Thesis

Presented to

The Faculty of the Master of Arts Degree Program

Salem-Teikyo University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

SO 030 832

by

Lucy E. Taylor

December 1998

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This thesis submitted by Lucy E. Taylor has been approved meeting the research requirements for the Master of Arts Degree.

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Abstract

This drawing study was done to see if sixth grade students could improve their drawing abilities by looking at lines more abstractly—by drawing a picture viewing the original upside down and comparing it to the same student's drawing done viewing the original right side up. Pairs of works were scored on the basis of line quality, proportion, and likeness to the original. The paired t-test revealed no significant effect on drawing ability when students used the upside down drawing technique as opposed to the traditional right side up approach.

CHAPTER 1

Statement of the Problem

Drawing ability seems to progress throughout childhood until about ages ten to twelve. At these ages the ability to grow artistically seems to freeze for many students. Can students be led through this frustrating drawing stage successfully by an instructor?

According to Betty Edwards (1979) in Drawing on the Right Side of the Brain, drawing does not seem to be very difficult. Seeing is the problem. Therefore, getting students to really see is the problem. The key to learning to draw is to set up conditions that cause you to make a mental shift to a different mode of information processing, the slightly altered state of consciousness that enables you to see well. She states that, "In this drawing mode you will be able to draw your perceptions even though you may never have studied drawing. Once the drawing mode is familiar to you, you will be able to consciously control the mental shift". This mental shifting is crucial in developing realistic drawings (Unsworth, 1996). The aim of visual analysis is to represent what is seen unclouded by what is known about the subject beyond its appearance, or by what is felt in relation to it. The goal is visual objectivity. Students need to overcome stereotypical seeing which blocks objective vision (Anderson, 1992).

Background

Realistic drawing is not valued above other kinds of art, however, realistic drawing is a stage to be passed through ideally at around the ages of ten to twelve. The beginning of adolescence seems to mark the abrupt end of artistic development in terms of drawing skills. These students are confronted with an artistic

crisis, a conflict between their increasing complex perceptions of the world around them and their current level of art skills. Children at this age have a passion for realistic drawing. They become sharply critical of their childhood drawings and begin to draw certain favorite subjects over and over again, attempting to perfect the image. Anything short of perfect realism may be regarded as failure. Therefore, to protect the ego from damage, children often withdraw from artistic expression at this point (Edwards, 1979, p. 63).

If drawing realistically at this age level is addressed by a trained art instructor, students can be successfully guided through this necessary artistic developmental stage. Edwards (1979, pp. 7-8.) states the three most important reasons for achieving realistic drawing skills as:

1) Through realism you learn to see deeply and profoundly.
2) You gain confidence in your creative abilities.
3) You learn to shift to a new mode of vast potential for insightful, creative problem solving.

Purpose of the Study

The intent of this research was to get sixth grade art students to become better observers of the world around them and to enable them to draw the real world with a higher degree of similarity to the observed image. Being better observers would enable them to pass through an essential artistic developmental stage. Ultimately, this would lead them into an area of creative thinking that would utilize their whole brain in art as well as across the curriculum.

The upside-down drawing assignment described by Beth Edwards in Drawing on the Right Side of the Brain (1979) was implemented. In the upright drawings familiar things

are recognized, named, and categorized by matching what is seen with stored memories and concepts, most often utilizing the left brain, resulting in stereotypical drawings. By having students draw upside down, she noted tremendous improvements in the quality of the drawings. She concluded that this type of drawing forced students to see shapes, areas of light, shadow and line, utilizing the right brain.

In this study, sixth grade students were tested with Edward's upside-down-right-side-up drawing assignment and the findings were recorded.

Research Question:

Will right brain drawing produce more realistic results in artwork at the sixth grade level than left brain drawing? If Edwards is correct this study will likely show that students' drawings will improve when drawn upside-down as opposed to right side up. This method of drawing something upside down will force students to observe more carefully spatial relationships, line quality, and proportion; tending to set aside predisposed ideas about the subjects they are drawing, resulting in more realistic drawings.

Null Hypothesis:

The null hypothesis is that there will be no significant effect of upside-down drawing on the students' renderings in the areas of line quality, proportion, and likeness to the original.

Variables:

The study is limited to sixth grade art students at Gap Mills School, Gap Mills, West Virginia.

Definition of Terms

Cerebral Hemisphere - The outermost part of the forebrain, separated into two halves on the right and left side of the brain.

Cerebrum - The main division of the brain consisting of two hemispheres.

Cognitive Shift - A transfer from one mental state to another. For example, from left-brain mode to right-brain mode and vice versa.

Contour Line - In a drawing, a line that represents the outer edge of an object.

Creativity - An ability to find completely new solutions to problems.

Intuition - Direct and apparently unmediated knowledge.

Left Hemisphere - The left half of the cerebrum.

Negative Space - The area around positive forms.

Positive Space - Forms or shapes drawn in an artwork.

Realism - The objective depiction of objects.

Right Hemisphere - The right half of the cerebrum.

Split Brain - A brain whose corpus callosum has been severed disconnecting the two lobes of the brain.

Significance of the Study

Getting students to experience the joy of thinking creatively should be a personal goal of any teacher. Schoolwork does not have to be hard, mind boggling, treacherous—not any subject. If a teacher sees her class bogged down with fact after fact and students seem more a

tarp than a sponge, she needs to change her approach. She should not automatically assume the fault is with the student and his/her lack of cognitive power. It may be that she is trying to activate the wrong side of the brain. She should try right-brain oriented activities like hands on, group learning experiments, motor activities and visual learning along with the more traditional approach (Unsworth, 1996). Learning from ones own experience conjures up new ideas and develops ones imaginative facilities. By contrast, failure to open all modes of learning to children is to lose some (Veale, 1991).

Limitations of the Study

This study concentrated only on sixth grade students at Gap Mills School, a rural school in southern West Virginia. Scoring student drawings was one of the limitations of the study. Unlike tests, which may be answered true or false and result in a percentage grade, these drawings were scored by one teacher using a value scale of zero to ten. The zero represented a very poor score, while ten was an excellent score. A copy of this value scale is found in Table 1 on page 23. The analysis of line quality, proportion, and likeness to the original, were all scored using the same zero to ten scale.

Scoring was a limitation in that there was only one scorer and that scorer's numerical interpretation was the only data used. An average of many scores given by different scorers would have been more ideal. After all, art is subjective and so is it's scoring to a degree. For example, what one scorer may have viewed as an average work and given a score of five; another scorer may have given a seven and called above average. Scoring differences would likely have differed from scorer to scorer simply due to personal opinion. Averages of several scores would have lessened this limitation.

CHAPTER 2

Review of the Literature

Drawing is a more natural way of human communication than writing. The oldest records of communication are drawings on cave walls. Written language was recorded thousands of years later. If this process of drawing is so natural, why are so many students stumped at drawing today (Unsworth, 1996)?

In early childhood, the alphabet is introduced and we learn to combine these symbols to make words -- a very left-brain process. Thus, children begin school already conditioned to left-brain drawing—copying cartoons, making stick figures, lollipop trees and relying on coloring book images. The right brain is very often ignored (Unsworth, 1996).

Ones ability to draw is not based on manual skill. If you can write, you have ample dexterity to draw well (Edwards, 1979). What gives one individual the ability to draw while others do not seem to have a clue where to start or what to do? The research shows that drawing requires a certain way of seeing and thinking (Williams, 1983). In order to stimulate this method of seeing and thinking, a close look at the brain and it's functioning is essential.

The brain weighs about three pounds and is composed of two hemispheres. Figure one in the Appendix illustrates this configuration. If you look at the brain from above, it appears walnut shaped, divided into two equal parts. No, we do not have two brains. We have one. The brain is split lengthwise down the middle, forming a narrow gorge that divides the cerebrum in half. These two halves are called the left hemisphere and the right hemisphere. Deep within the brain, these hemispheres are connected by a bundle of nerve tissues call the corpus callosum. This corpus callosum is the hemisphere integrator. It acts as a telegraph line between the two hemispheres. Without it, whole brain thinking would be

impossible(Vitale,1986).

In the nineteenth century, scientists assumed the hemispheres of the brain to be identical and thought perhaps nature had provided a second, duplicate hemisphere as "backup" in case of injury to the primary hemisphere. It is only in recent years that scientists have begun to unravel the mystery of brain functioning (Williams, 1983).

Over the years, many people with split-brains have been studied, and have given science a clearer understanding of the division of cognitive functions between the hemispheres. Through these studies of brain-damaged individuals, much has been learned about brain functioning. The severed corpus callosum in these people left each with no communication between the brain hemispheres. Thus, making it clearer which half of the brain is responsible for certain tasks (Sylvester, 1995).

Gerald Eldman received the Nobel Prize in 1972 for a major physiological or medical discovery about the immune system. He since has turned his attention toward the brain. He is currently Director of the Neuroscience Institute and Chairman of the Department of Neurobiology at the Scripps Research Institute (Sylvester, 1995).

Eldman describes the brain as a rich layered, messy, unplanned jungle ecosystem that responds to various environmental changes. The natural selection processes that shape a jungle over time have also shaped the brain over an extensive period of time, and shape our brain's neural networks over our lifetime (Sylvester, 1995).

The left hemisphere is responsible for the right side of the body, while the right hemisphere is the controlling force of the left side. Beyond the crossing over of motor skills to the opposite side of the brain, research shows that damage to the right hemisphere results in impaired performance of spatial tasks, such as the ability to draw, while damage to the left hemisphere impaired verbal sequential ability (Ornstein and Thompson, 1984).

The left hemisphere is specialized to process codes both written and spoken. It attends more to rules of conduct and the formalism of society (Vitale, 1986). Williams (1983) states it is linear and sequential moving from one point to the next in a step-by-step manner. It is busy separating out the parts that constitute the whole. Left–brain students tend to do very well in the typical classroom where students learn information from books, lectures, mimeographed sheets and workbooks.

The right hemisphere specializes in images and nonlinear relationships. It combines information from parts to create a whole unit. It synthesizes. It seeks and constructs patterns and recognizes relationships between separate parts. The right brain processes simultaneously, being most efficient at visual and spatial processing (images), its language capacity is extremely limited, words seem to play little or no part in it's functioning (Williams, 1983). Right brain students do very well in creative art, singing, science, music and geometry (Vitale, 1987).

Together, words and images communicate more clearly than either could alone. (Williams, 1983) Figures four and five clearly demonstrate that both methods of learning compliment one another; thus resulting in an equally "well-rounded" student.

This brain research is invaluable to teachers according to Anita N. Kitchens in her report entitled "Left Brain/Right Brain Theory" (1991). The different functions of the right and left hemisphere of the brain require different approaches of education. She states, "Due to their emphasis on language and verbal processing, schools have failed to give adequate stimulation to the right side of the brain and thus tend to discriminate against right-brain-dominate people. Many students who are right brain dominate have struggled in school because they were never taught in their natural thinking style." (p. 1).

Students tend to approach problem solving from either an intuitive or logical point of view. Edwards and Sparapani (1990) conclude that when one method alone is addressed, negative classroom experiences result. They recommend educators accommodate both learning styles.

"In school, knowing is often equated with being able to express oneself verbally" (Williams, 1983, p. 18). Helping students become effective thinkers is increasingly recognized as a primary education goal. Curriculums should empower students to locate and process knowledge rather than simply memorizing facts. "Although we choose much of what students are supposed to learn, we should present the information in a way that allows students to extract patterns," state Edwards and Sparapani (1990, p. 4).

"While scientists have come far in the field of brain research and functioning, the general public and, unfortunately some teachers, have oversimplified their view of the brain. Incorrect assumptions on the part of teachers can lead to ineffective teaching strategies and impair learning" (Williams, 1983, pp. 24-25).

The two following lists by Microsoft Word: Windows 95 (1995) give a through comparison of left and right hemispheric characteristics.

Left Verses Right Brain Modes

Left—Verbal: uses words to name, describe, and define things

Right—Nonverbal: responds to tones, music, body language, touch

Left—Analytic: examines things part-by-part

Right—Synthetic: arranges parts to form a whole

Left—Logical: uses a rational approach to reach a conclusion

Right—Intuitive: follows hunches or feelings

Left—Sequential: arranges events and actions in consecutive order

Right—Random: arranges events and actions haphazardly

Left—Systematic: processes information methodically

Right—Casual: deals with information on the basis of timely need

Left—Symbolic: uses representational symbols

Right—Concrete: relates to things as they are commonly known

Left—Linear: sequences thoughts to form a convergent conclusion

Right—Holistic: sees overall patterns to form a divergent conclusion

Left—Factual: deals with details and particulars

Right—Visual: uses imagery, pictures, colors, shapes

Left—Abstract: is theoretical, intellectual, idealistic

Right—Sensory: is oriented toward physical feelings

Left—Temporal: keeps track of time

Right—Nontemporal: has little or no awareness of time.

Left—Digital: uses numbers as in counting

Right—Spatial: relates parts to the whole

Left—Computational: uses mathematics and computers to estimate

Right—Visuo-spatial: uses intuition to estimate or perceive shapes

Left—Methodical: organizes, classifies, categorizes, structures

Right—Responsive: listens to music

Left—Practical: thinks in terms of cause and effect, purpose and use

Right—Originative: thinks imaginatively about theories and ideas

Left—Rational: Uses reason and factual data

Right—Emotional: suspicious in judgement until it feels or seems right

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The two lists on this page show typical behaviors of a left- brain individual and a right-brained individual. It allows for a quick comparison of the two hemispheres and their functioning.

Left Brain behaviors respond to:	**Right Brain behaviors respond to:**
Recognizing and remembering names	Descriptive, concrete
Verbal instructions / information	Recognizing and remembering faces
Processing information sequentially	Visual and kinesthetic instruction
Evaluating their performance to some standard	Emotional responses (strong)
Serious, systematic problem-solving	Producing humorous thoughts /ideas
Critical, analytic reading / listening	Processing information subjectively
Problem-solving through logic	Emphasizes second person
Remembering through language	Playful problem-solving
Reading for detail and fact	Intuition used in problem-solving
Realistic stories	Demonstrational in instruction
Learning through systematic plans	Remembering through images
Outlining rather than summarizing	Reading for main ideas
Remembering verbal qualities	Fantasy, poetry, myth
Well-structured assignments	Learning through exploration
Independence	Summarizing

(Microsoft Word: Windows 95, 1995.).

It is important to recognize that statements, which are true in general, may not apply to a specific child. Everyone is a unique individual with his own unique brain mapping. No

two brains are functionally identical. A classroom is full of individuals. The teacher's awareness of just how uniquely each child's mind works, could only serve to sharpen her sensitivity to each one and to that child's best learning style (Williams, 1983).

Drawing Stages

Developmental stages of children's art work parallel to the developmental changes in the brain. In early stages, an infant's brain hemispheres are not specialized for separate functions. This specialization of function to hemisphere occurs gradually (Edwards, 1979).

The first drawing stage is the random scribbling stage. It begins at about age one and one half when a child realizes he is controlling the pencil and making a black line appear. At age two, the child begins to make circular marks. Shortly thereafter, he passes through a controlled scribbling stage, where the circular symbol could represent many things in his environment! It could be Mommy, a dog, or a table. He names all his scribbles. At three and one half, the child attaches a body to his circle. Arms and legs are attached, showing the child's increasing awareness and perception of the world around him (Brittain, 1979).

At age four, a child's art reflects a new keen awareness to detail. Fingers, toes, buttons, and zippers appear. At age five, children begin to tell stories with their drawings and to make adjustments to basic forms they have used in the past. At age five or six, children develop a set of symbols to create a landscape. Balance becomes important in the drawings and every symbol has its place. For the next few years children tend to "perfect" their series of symbols, experimenting with placements, detail, and shape (Edwards, 1979).

At age nine or ten, children use more detail in their artwork hoping to gain greater realism, which is a prized goal. Drawings become more complex and differentiated by sex; for example, boys draw things such as hot rods and warriors, and girls draw pretty women and vases of flowers (Edwards, 1979).

At around age ten or eleven, a child's passion to depict the real world is in full bloom! When their drawings do not come out "right", they are very discouraged and are convinced they can not draw. Their problem is that previously stored knowledge, which is useful in other contexts, prevents their seeing the objects as they are, right before their eyes. Most teachers wish these students would become freer and less concerned with realism. However, children themselves are relentless. They will have realism or give up the art altogether (Edwards, 1979). These students who will draw only airplanes, trees, or other memorized shapes are exhibiting left-brain control. They are often very bright but will draw only what will turn out "right", because of a fear of failure. A child such as this will look at a tree and think; there are lots of branches, a trunk, and leaves at the top. Then without looking at it again, that child will draw a tree. This left-brain child will draw the lollipop tree relentlessly with little to no change each time (Unsworth, 1996).

Betty Edwards (1979) states that children this age love realism because they are trying to learn how to see. Some students are able to discover this secret of how to see in the right-brain way. However, the large majority of children needed to be taught how to make this cognitive shift. She adds that through recent brain research, we are enabling teachers to help satisfy children's yearning for seeing and for drawing skills.

"The classroom teacher can lead all students to right brain drawing by simply telling them to 'draw with their eyes', by directing them to follow every edge of the object with their eyes and let their hands record what the eyes see " (Unsworth, 1997, p. 27). When this right-brain drawing method is used, the child takes a visual journey. In the drawing of a tree that child takes a visual trip up the tree, branch by branch, looking more at the tree than at the drawing. The child will be looking carefully, sequentially, meditatively at the tree, resulting in a more proportionate, detailed figure.

Ann Veale's paper entitled, "Equity and Art" (1991) states that, "The process of visualizing, problem solving and talking about art may not produce immediate results but it does provide children with options of alternative ways of representing experience. In evaluating our modes of thinking, we need to give consideration to the deeper, more hidden curriculum aims as well as to the immediate objective!" "Balancing the functions of the left and right brain or maximum developmental potential is imperative, not just for the artistically gifted student but for all children." (p. 12).

In an article written by David E. Fernie (1992), profiling Howard Gardner's research on intelligence, Gardner feels "American students are the most tested, least examined students in the world" (p. 226). That, "too much value is placed on the left brain task of memorization and regurgitation of facts. That we need to test students not only on what they have been taught but to have them stretch their mental muscles in new and appropriate ways with applications". He states, "If a student is to 'understand deeply' he or she must immerse himself or herself in subject matter learning to think of it and to approach it in a variety of ways. We must sacrifice coverage for uncoverage— must embrace the belief that 'less can be more'. To be able to understand—to be able to use one's knowledge productively, to solve problems and to raise new questions—is the greatest 'high' that I know of" (pp. 223-224).

Across Curriculum

A paper by Lois M. Christensen (1991) addresses the concern that Social Studies has traditionally been taught in the left brain mode, tapping only about thirty percent of the classroom population's learning style. She says, "We learn most preferably through our own personal learning style; our innate inclination toward processing information." (p. 3). She sums up that teachers must address the other seventy percent of the classroom

population through lessons tailored to their learning styles, a student-centered approach, a holistic (right-brained) approach (Christensen, 1991).

Dennis Drake (1993) compares the similarity in information processing in the fields of Art and Science. Both fields use the same visual/brain processing systems. Here are some examples: both share the use of imaginative thinking, both fields show direct interaction with the fields of scientific illustration and illustrations of science fiction, both fields use mathematics, both fields use physical models, and both fields explore the unknown. A scientific/artistic way of understanding is purely subjective or right brained. Individuals functioning within both art and science disciplines are reaching out to grasp things not currently existing in the world of perception.

Peter Edwards (1990) in his paper entitled "Study experiences for the Language Arts" discusses a method of teaching Language Arts that transcends the limitations of content. It too chooses exercises that will lead students through higher-order thinking skills. The students get a choice of left-brain, right brain, or whole-brain activities to learn new information.

Joel Geske's paper (1992) entitled "Teaching Creativity for Right-Brain and Left-Brain Thinkers" describes how writing is both a right and left brain function. He explains several techniques to help students take advantage of both sides of their brain. Brainstorming techniques and role playing help students explore different ways of developing ideas and visualizing creative approaches.

Anita Kitchens (1991) reports that Math scores were significantly higher when students were taught math concepts in both a right and left-brain approach. She points to

the idea that teachers should be able to both diagram and talk through mathematical processes so that they are stimulating students visually and verbally.

Williams (1983), like Kitchens, contends that math teachers should orally cover math procedures, so students can see and hear solutions. This would allow both oral and visual learners to benefit.

Unsworth (1996) suggests that art or right-brained activities should be woven across the curriculum. In history or social studies, role playing, models or drawings could bring the subjects to life. In math, scale drawings, graphs and sketches could help students understand concepts. In science, figure drawing and illustrations can give a deeper understanding of the subject. She states that, "All learning really connects, but the, structure of the school system separates it into content areas contained in a textbook." (p. 68). Educators must realize that all subjects are interrelated. No subject or method of teaching can stand completely alone. Students deserve to be taught in their own learning styles and will be much richer for it.

Lord (1991) cited evidence that a great deal of math and science were right hemisphere functions, the areas of problem solving and imagery manipulation in particular. Research has also shown successful students in physics, chemistry, and biology tend to be right hemisphere conceptual learners (Creswell, Gifford, and Huffman, 1988).

In a study by Cynthia Miller in 1988, an investigation into lateralization exercises showed a positive effect on achievement in college calculus. Right-brain dominant students out performed the left-brain dominant students when these exercises were used. The previous year's study had shown left-brain dominant students successful

and right-brain students unsuccessful in the calculus class. Miller concluded that course grades were significantly higher when students' hemispheric laterality matched their treatment group, right-brained students doing right brain exercises and left-brain students doing left brain exercises (Kitchens, 1991).

In school systems, curriculum is left-brain based. Students who tend to interpret symbols of any kind, such as number and letter symbols tend to do well. The areas of language, including verbalization, phonics, and reading come easily to them. They have the ability to deal with details and facts, to follow directions, and make auditory associations (Vitale 1986).

However, students have a whole brain. Why stimulate only the left half?

In the right hemisphere is another set of skills. The right hemisphere has the ability to recognize and process non-verbal sounds, communicate through body language, recognize, draw and deal with shapes and patterns, as well as geometric figures to distinguish between different colors, hues, and the ability to visualize (Vitale, 1986).

The right brain and the left brain have specialized thinking characteristics. They do not approach life in the same way; yet both hemispheres use high level cognitive modes. Students deserve to be taught the differences between left-brain and right-brain thinking and how to think in the "Whole-Brain Way" (Kitchens, 1991).

Can inactive parts of the brain be stimulated to complete an assigned task? Can we jumpstart a part of the brain that has not been "started" or that has been "turned off"? If so, wouldn't learning increase a great deal in all subject areas including artistic expression?

CHAPTER 3

Research Design

Will looking at a drawing abstractly, upside down, stimulate the brain in a new way resulting in more realistic artworks by sixth graders? Will their inability to memorize the picture with the left-brain, force a shift to the right-brain drawing mode, resulting in a more accurate duplication of the original drawing?

Students were given a drawing by Picasso called "Portriat of Igor Stravinsky" (see Figure 3). The first day, students were asked to duplicate this portrait right side up. It was to be finished in a forty-five minute class period. Students were asked to do the best they could and were told that the work would not be graded. They worked on a piece of typing paper using pencils. They were asked to start at the top and work down duplicating the original line by line.

On the second day, the students were asked to draw the same picture upside down. This time, Picasso's "Portriat of Igor Stravinsky" was taped upside down on the table to discourage turning it right side up (see Figure 2). The drawing was to be completed in forty-five minutes. The class was told that this experimental method of drawing was not for a grade. Students were asked to start at the top and work down, putting their lines together like a jigsaw puzzle. They were asked not to concern themselves with naming the parts of the picture, only drawing lines and curves as they saw them in the example, not to worry about the end result or about the subject they were drawing.

Description of Population

The research population consisted of forty-seven sixth grade students at Gap Mills School in Monroe County, West Virginia. This is a rural community of working class farmers, loggers, and laborers. Over fifty percent of the school population qualifies for the free lunch program due to the low household incomes. These students range in ages from eleven to thirteen. Two students are special education students with disabilities in reading. Twenty-three of the sixth graders are male and twenty-four are female.

This group of students consisted of two separate classrooms. One group met on Monday and Tuesday to complete their drawings while the other group completed their drawings on Wednesday and Thursday. Originally there were fifty-two students in the study; however, absences by five students trimmed the total number of students completing the study to forty-seven.

This drawing test was administered each of the four mornings (Monday through Thursday) starting with a description of the assignment at 8:40 a.m. The actual drawing started at 8:45 and lasted until 9:30. Finishing times varied, with some finishing with time to spare, while some did not finish in the allotted time. All works were collected at the end of the forty-five minute drawing time.

Two or three students sat in assigned seats at each table. The tables were in two rows facing the front wall where the researcher's desk is located. The room was well lit with six florescent lights. There was one window at the back of the room as well as the entrance/exit door. The walls were lined with student artworks.

This test was given during the month of October. The reasoning behind choosing this time of year was twofold. The first reason was to give students time to loosen their

drawing skills after being out of school for almost three months during the summer. The second reason was that the school calendar reflected that there would be no interruptions during this time. The office was also notified of the study and cooperated by keeping the room free of any outside disturbances. The students were especially well behaved and eager to participate in the study.

Instrumentation

Students' right-side-up drawings were scored on a scale of zero to ten for the elements of proportion, line quality, and realism. A score of zero showed very poor rendering, while a score of ten reflected excellent rendering. Each of the three factors was scored separately. Table 1, on the next page is a copy of the scale used.

Conversely, up-side-down drawings were scored on a scale of zero to ten for these elements as well. Both sets of scores were compiled for each child and documented (See Table 2, pp.24-26).

Students had been assigned numbers one through forty-seven so scores could be paired later. On the day these works were drawn right side up, an "R" was placed by the assigned number on the back of the drawing. On the day works were drawn upside down, the letter "U" was placed beside the number.

Data Collection Methods

Student works were picked randomly and scored. Each work was scored separately for line quality, proportion and likeness to the original using the scale on page 23. All the drawings were scored the same way, the same day, by the same researcher. The scores were then paired and placed on a chart. This chart enables one to compare the two drawing methods' scores readily for any given student.

Table 1

Value Scale

Value	Score Interpretation
0	Very poor
1	Poor
2	Slightly poor
3	Below average
4	Slightly below average
5	Average
6	Slightly above average
7	Above average
8	Good
9	Very Good
10	Excellent

Table 2

Drawing Method Scores

Abbreviations: LQ – Line Quality
PP – Proportion
LO –Likeness to Original

	Scores for Right-Side-Up Drawing			Scores for Upside-Down Drawing			Signed Differences Between Scores (UD-RSU)		
Student	LQ	PP	LO	LQ	PP	LO	LQ	PP	LO
#1	5	5	5	4	4	4	-1	-1	-1
#2	3	4	3	3	4	4	0	0	1
#3	8	6	8	9	8	9	1	2	1
#4	4	5	4	4	3	3	0	-2	-1
#5	4	4	4	5	5	5	1	1	1
#6	6	5	6	7	5	6	1	0	0
#7	5	4	5	5	4	6	0	0	1
#8	4	5	5	5	6	6	1	1	1
#9	5	5	5	5	4	5	0	-1	0
#10	2	2	2	4	3	3	2	1	1
#11	6	6	6	6	6	6	0	0	0
#12	6	5	6	6	6	6	0	1	0
#13	4	5	5	4	3	3	0	-2	-2
#14	5	4	5	4	4	4	-1	0	-1
#15	3	2	3	3	3	3	0	1	0
#16	9	8	8	9	9	9	0	1	1
#17	8	7	8	9	8	9	1	1	1
#18	4	5	5	4	4	4	0	-1	-1
#19	5	5	5	2	1	1	-3	-4	-4
#20	3	4	4	4	4	5	1	0	1

Chart cont.

	Scores for Right-Side-Up Drawing			Scores for Upside-Down Drawing			Signed Differences Between Scores (UD-RSU)		
#21	6	8	8	8	8	9	2	0	1
#22	3	5	4	3	5	4	0	0	0
#23	10	10	10	9	7	8	-1	3	-2
#24	5	5	3	2	2	2	-3	-3	-1
#25	9	9	9	9	9	8	0	0	-1
#26	9	8	9	8	9	9	-1	1	0
#27	1	1	1	1	2	2	0	1	1
#28	8	9	9	8	8	8	0	-1	-1
#29	7	7	7	7	6	7	0	-1	0
#30	7	5	7	9	8	8	2	3	1
#31	5	6	5	1	2	1	-4	-4	-4
#32	1	4	3	9	9	9	8	5	6
#33	6	6	6	6	7	6	0	1	0
#34	6	8	8	5	5	5	-1	-3	-3
#35	5	5	5	6	6	6	1	1	1
#36	1	1	1	3	4	4	2	3	3
#37	2	3	2	3	3	2	1	0	0
#38	6	7	7	3	3	3	-3	-4	-4
#39	1	0	0	1	0	1	0	0	1
#40	5	5	5	5	4	4	0	-1	-1
#41	1	0	0	4	4	4	3	4	4
#42	5	5	5	5	5	5	0	0	0
#43	2	3	1	2	1	1	0	-2	0
#44	5	5	5	4	5	5	-1	0	0
#45	1	1	1	3	3	3	2	2	2

Chart cont.

	Scores for Right-Side-Up Drawing			Scores for Upside-Down Drawing			Signed Differences between Scores (UD-RSU)		
#46	2	4	3	2	2	1	1	-2	-2
#47	1	2	1	2	1	2	1	-1	1
						Average =	**+.23**	**-.13**	**+.02**
						Std. Dev.=	**1.80**	**1.95**	**1.85**

CHAPTER 4

Data Analysis

Scores were compared per student to see if these methods of drawing yield different results. An overview of the entire classes' scores was made to determine if there seemed to be any difference in scores. A paired t-test for differences was used to analyze the data. The different score for each student was found by taking the upside-down score minus the right-side up score. A significance level was tested using a=.05. Below you will find a step by step data analysis.

Independent Variable = type of drawing (right side up, upside down)

Measurement Level of Independent Variable = dichotomy (2 classes)

Dependent Variables = 1) line quality

2) proportion

3) likeness or original

Measurement Level of Dependent Variables = ordinal

*Assuming the ordered categories are roughly equidistant, then the dependent variables can be treated as measurements at the interval level.

Test Procedure: paired t-test for each dependent variable

n = number of observations = # of students = 47

d = upside-down score minus right side up for each student

(average difference between scores)

s = standard deviation of differences between scores

t = t value = d/3d

p = p – value corresponding to t

Line Quality Analysis

First, line quality was examined. The null hypothesis was that the average line quality score would be the same for right-side-up drawings and upside-down drawings. The alternative hypothesis was that the line quality score is greater for upside-down drawings than for right-side-up drawings. The significance level for testing the null hypothesis against the alternative hypothesis is a = 0.05.

Test Procedure = Paired t-test

n = 47

d = 0.23

s = 1.80

t = 0.893

df = 46

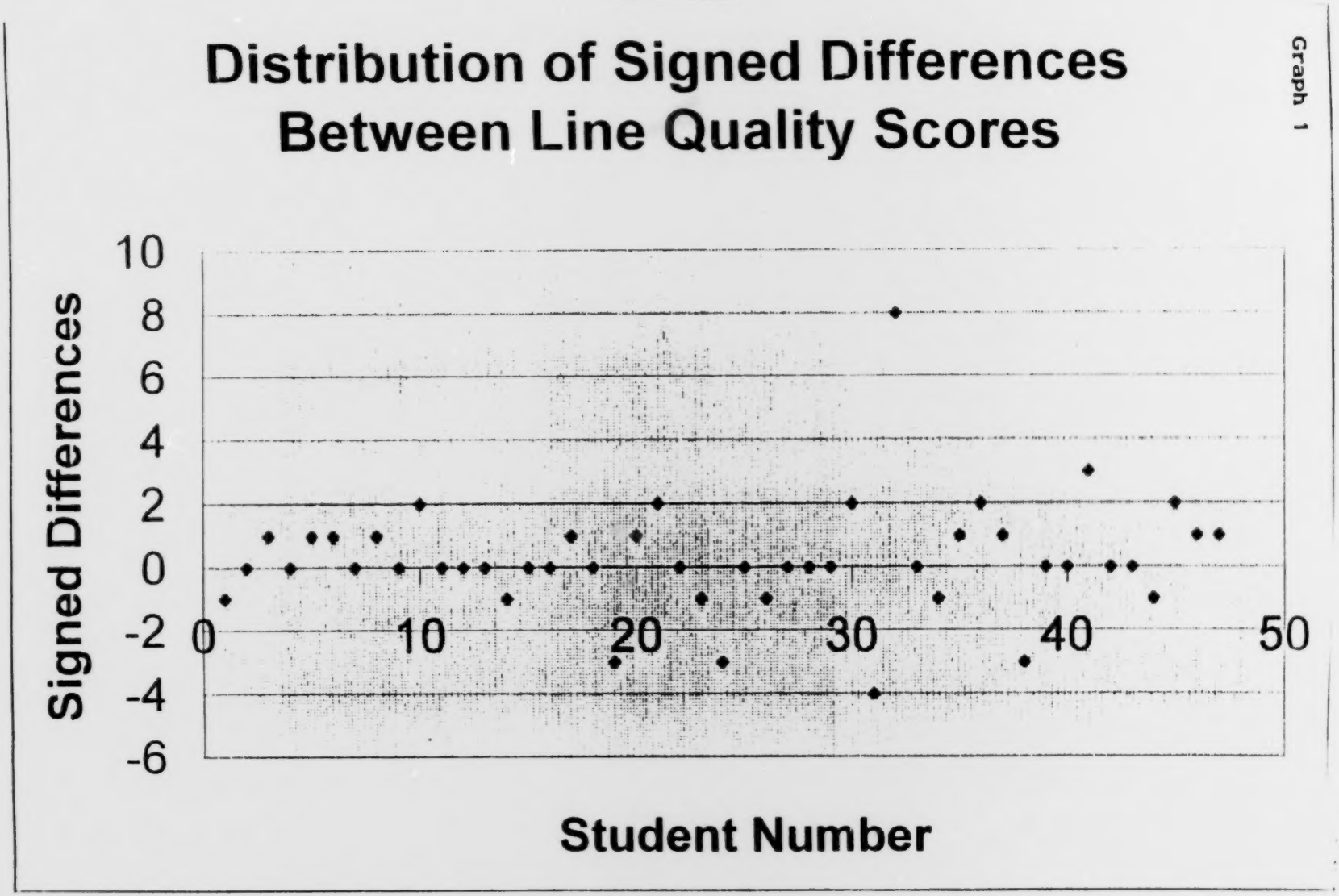
p = 0.1882>0.05

There is insufficient evidence to conclude, at the 0.05 significance level, that the average line quality score is greater for upside-down drawings than for right-side-up drawings. Therefore, the null hypothesis failed to be rejected.

Notes from the distribution of signed differences:

(1) apparent outlier of + 8 (student #32)

(2) possible outliers at – 4 and –3



Graph 1

Right Brain Drawing Study

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Proportion Analysis

Secondly, proportion was examined. The null hypothesis was that the average proportion score would be the same for right-side-up drawings and upside-down drawings. The alternative hypothesis was that the average proportion score is greater for upside-down drawings than for right-side-up drawings. The significance level for testing the null hypothesis against the alternative hypothesis is a = 0.05.

Test procedure = paired t – test

n = 47

d = -0.13

s = 1.95

t = -0.448

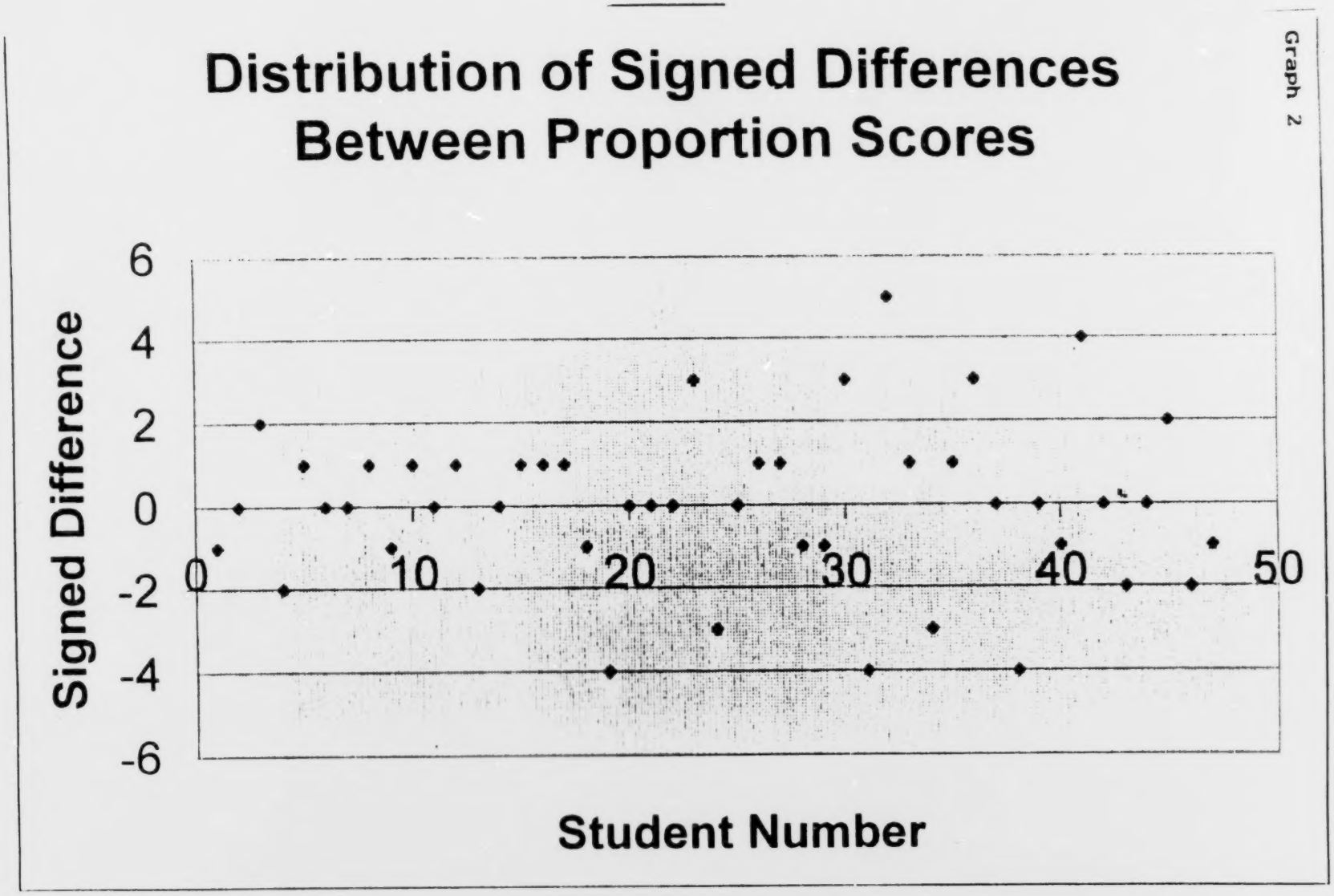
df = 46

p = 0.6720>0.05

There is insufficient evidence to conclude, at the 0.05 significance level that the average proportion score is greater for upside-down drawings than for right-side-up drawings.

Note from the distribution of signed differences:

(*) possible outliers at –4 and +5



Graph 2

Right Brain Drawing Study 31

Likeness Analysis

Last, the scores for likeness to the original were examined. The null hypothesis was that the average likeness –to-original score would be the same for right-side-up drawings and upside-down drawings. The alternative hypothesis was that the likeness-to-original score is greater for upside-down drawings than for right-side-up drawings. The significance level for testing the null hypothesis against the alternative hypothesis is = 0.05.

Test procedure = paired t – test

n = 47

d = 0.02

s = 1.85

t = 0.079

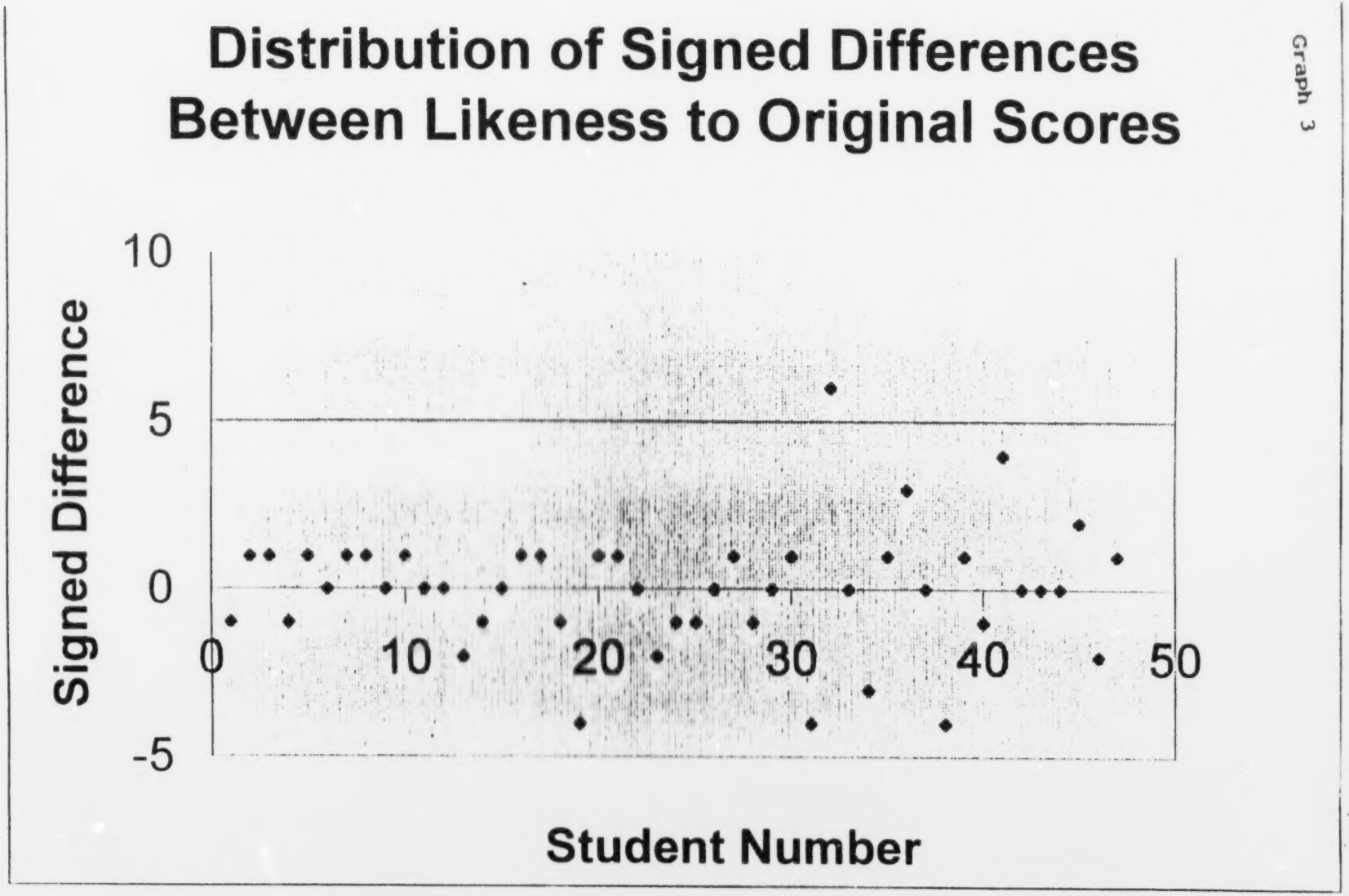
dt = 46

p = 0.4687 > 0.05

There is insufficient evidence to conclude, at the 0.05 significance level, that the average likeness-to-original score is greater for upside-down drawings than for right side-up drawings.

Note from the distribution of signed differences:

(*) possible outliers at –4 and +6



Graph 3

Right Brain Drawing Study 33

CHAPTER 5

Conclusions

As analyzed using paired t–tests, the data do not support a conclusion of greater average scores for upside-down drawings than for right-side-up drawings. This lack of support is especially evidenced by the proportion scores ($d<o$) and the likeness-to-original scores ($d=0$).

There is possible indication that a small proportion of students improve by drawing upside-down as in the drawings of students #32 and #41. These student drawings appear in the Appendix, Figures 6, 7, 8, and 9. On the other hand, a small portion of students did worse in the upside –down drawings. Such is the case of students # 19 and # 31. These students' drawings are also located in Appendix, Figures 10, 11, 12, and 13. The great majority of students' ability to draw something was neither increased nor decreased by drawing it right-side-up or upside-down.

One of the assumptions of the paired t–test is that the differences follow a normal distribution. Normally distributed data do not contain outliers (usually extreme values) except perhaps for large data sets. In the line quality analysis, student #32 is an apparent outlier, while students #19, #24, and #31 are possible outliers at –4 and –3. In the area of proportion analysis, there are possible outliers at –4 and +5 for students #19, #31, #32, and #38. While analyzing likenesses to the original, possible outliers were found at –4 and +6 noted in students #19, #31, #32, and #38.

Large negative differences or large positive differences tend to occur together as noted in scores for student #'s 19, 31, 32, 38, and 41. Negative and positive differences

rarely occur together. It only occurs in two cases of student's, #26 and #47, and the differences in these two cases are small.

The data fail to reject the null hypothesis. There was no significant effect of upside-down drawing on the student's renderings in the areas of line quality, proportion, and likeness to original.

Discussion

This study leads to many other questions.

1. If a different drawing was selected for duplication, would the results be the same?
2. If the same students were tested now as eighth graders, would the results be similar?
3. If students practiced this right-brain drawing exercise, for a period of time before administering the test, would results vary?
4. Would drawing from an actual model change the results of the study?

This study did not support the hypothesis that students' drawings would improve drawn upside-down. This may have been partly due to the subject matter chosen for duplication. The "Portrait of Igor Stravinsky" by Pablo Picasso did seem somewhat difficult for the "above-average" sixth grade art student. The entire forty-five minute class period was used by most students. Loss of concentration on the task due to the complexity of the drawing may have been a problem as well as the lengthy time students were expected to stay in this drawing mode. Choosing a less complex drawing subject and a shorter time frame may have yielded different results.

Scoring by more than one observer could have also made a difference. Since scoring was subjective, scores would have varied from observer to observer.

The hypothesis that right brain drawing would produce more realistic drawing results in sixth grade students was not proven. However, Betty Edward's (1979) hypothesis that one can learn to develop the right side of the brain should be studied in greater depth. The idea that students could be more successful observers, learners, and thinkers should be very exciting to educators, to parents, to everyone.

The right brain has historically been an untapped resource. That needs to change! These three right-brain thinkers were thought to be academic failures early in life due to their learning styles. Albert Einstein was four years old before he could speak. Werner von Braun failed ninth grade math. Thomas Edison was told he was too stupid to learn anything. These men are now known for their genius (Kitchens, 1991). Luckily these right-brain thinkers succeeded despite traditional education methods.

Classroom teachers often teach content, and they know that content well! What many of them have not been trained in is the functioning of the brain. In essence, they are teaching to the brain but know little to nothing of its functioning. How does the individual brain process all this content? If educators knew more about how the brain worked, then they would be more effective in their classrooms.

As teachers learn more about brain functioning, their right-brained students will not be neglected in the classroom. Teaching methods such as brain storming, guided imagery, visualization, critical thinking, and problem solving will become common teaching techniques. Developing the whole brain will become a top priority for educators. Everyone will profit.

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APPENDICES

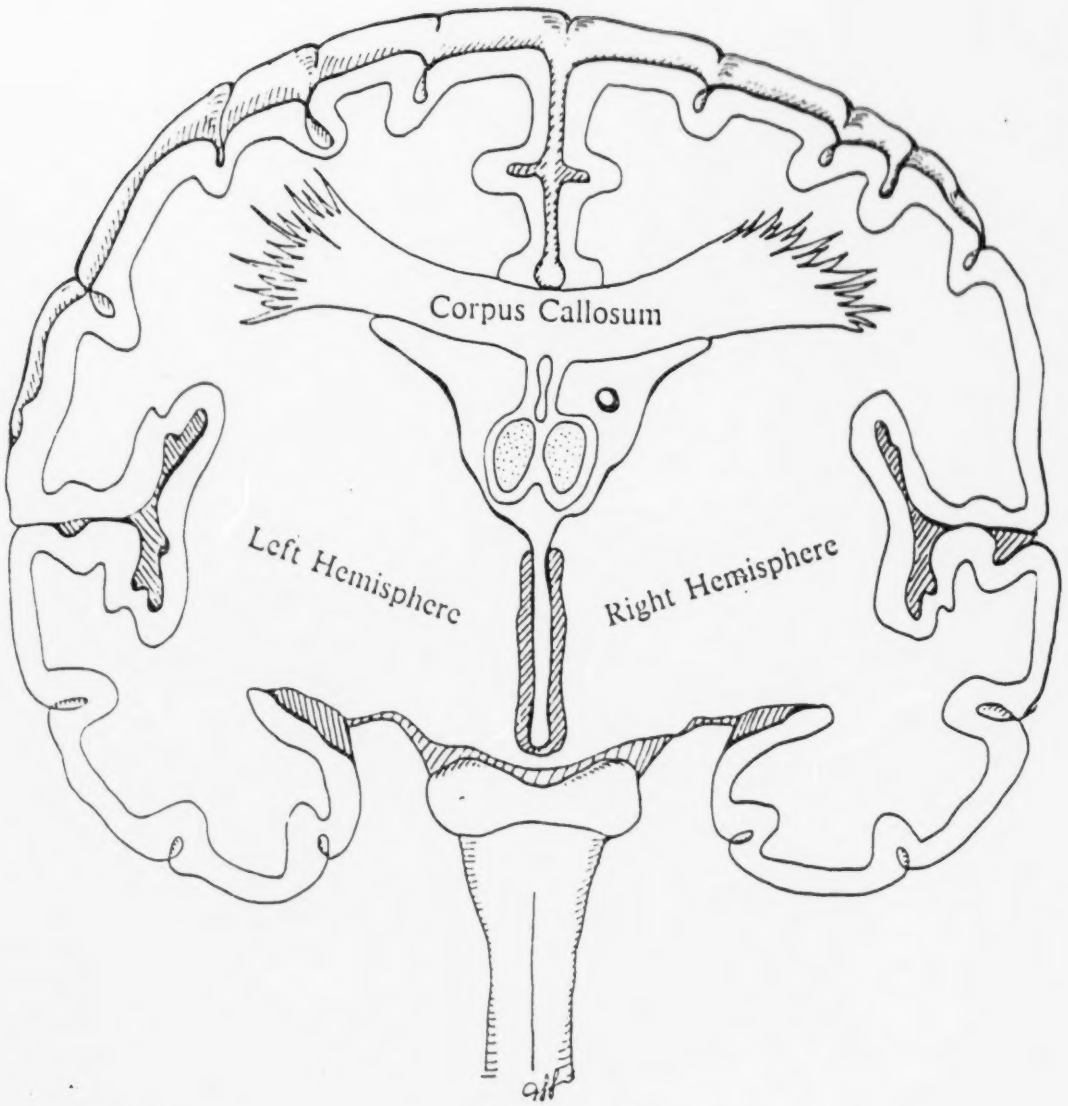

Fig 1. Simple Diagram of the human brain.

Source: Vitale, 1986, p.2.

Fig. 2. "Portrait of Igor Stravinsky" by Pablo Picasso. A copy of this picture was given to each student intentionally positioned up-side down.

Source: Edwards, 1979, p.52.

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Fig. 3. "Portrait of Igor Stravinsky" by Pablo Picasso.

Source: Edwards, 1979, p.52.

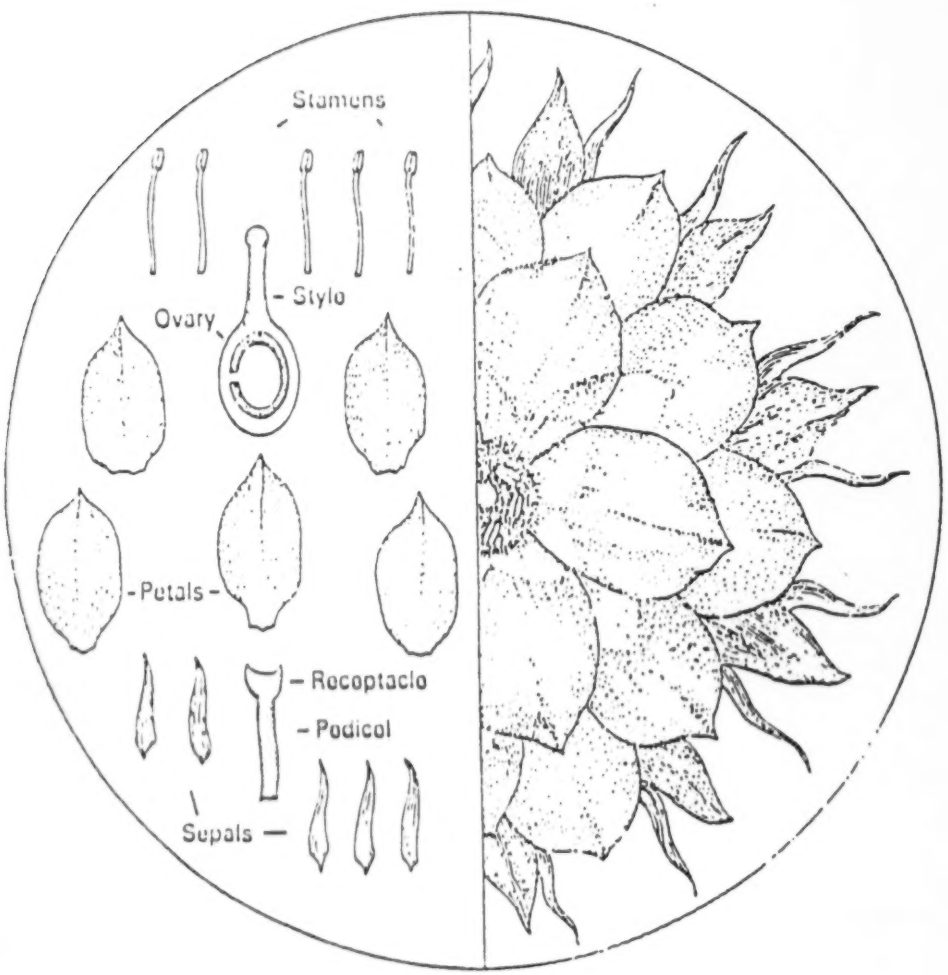

Fig. 4. Visual imagery showing how the two brain hemispheres process information. The left hemisphere sees the individual parts, while the right hemisphere sees the whole.

Source: Williams, 1983, p. 3.

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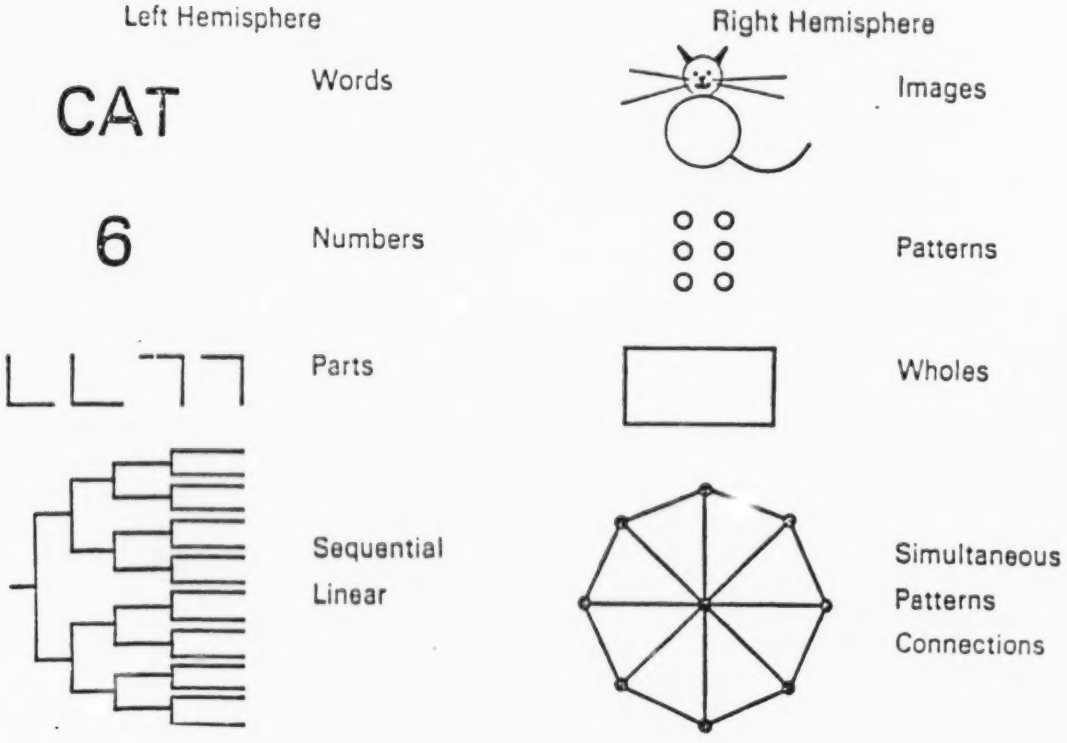


Fig. 5. The differences between the processing styles of the left and right hemispheres presented both visually and verbally.

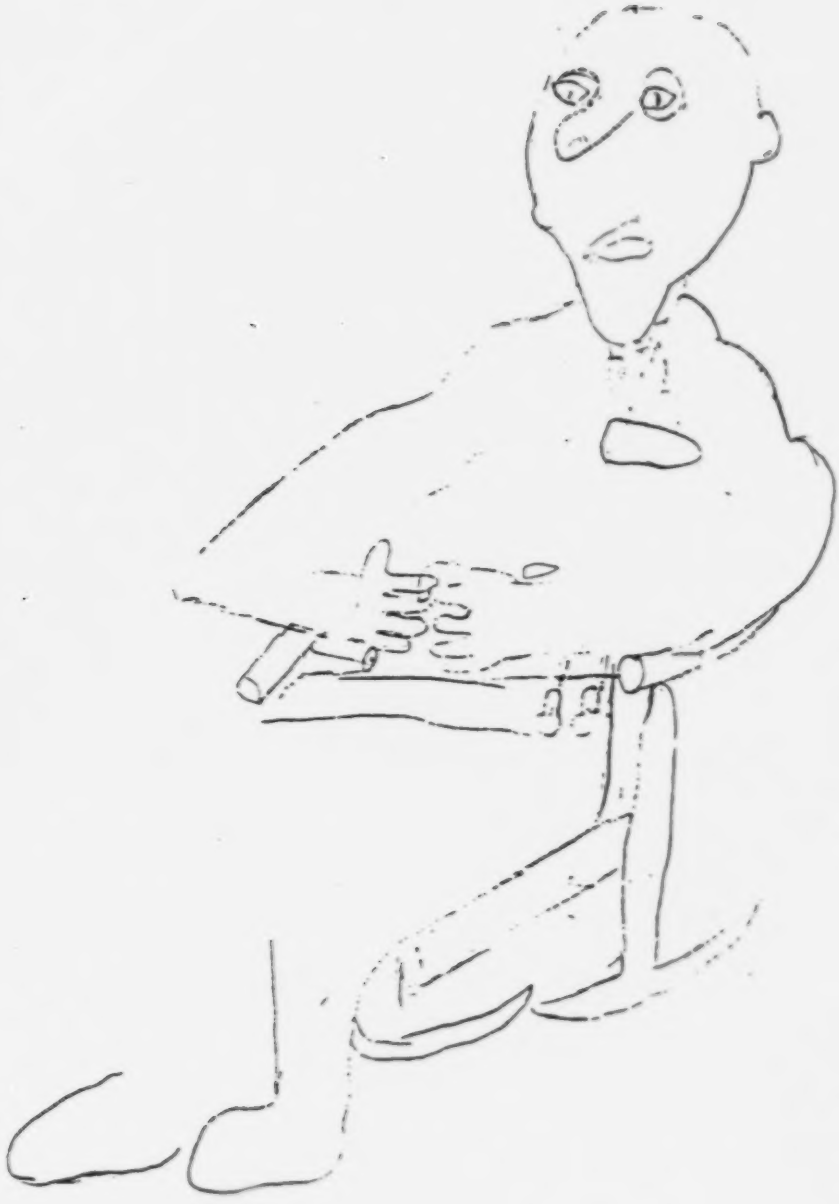
Source: Williams, 1983, p. 5.

While drawing right-side-up this student seemed to ignore the bent arms of the chair. This makes the man appear very round. In order to lock his hands together, five digits were hurriedly drawn over one another.

Fig. 6. Drawn viewing the original right-side-up by student #32.

Student #32 has made progress in this up-side down drawing. The face is much more like the original. Igor's arms rest on the chair arms, and a real attempt is made at drawing the interlocking hands. Compare this to the same student's drawing in Fig. 6.

Fig. 7 Drawn viewing the original up-side-down by student #32.



It appears this student had a preconceived idea that this was a picture of a man sitting in a chair. Little attempt was made to follow the original. Note the rockers on the bottom of this chair as well as the feet on the man. These items do not exist in the original. (See Fig. 3)

Fig. 8. Drawn viewing the original right-side up by student #41.

When drawing upside-down, this student's drawing improved a great deal in all three areas scored. Compare this drawing to Figure 8 drawn by the same student.

Fig. 9. Drawn viewing the original up-side-down by student #41.

This drawing shows more fluid line quality than his up-side-down drawing in Figure 11.

Fig. 10 Drawn viewing the original right-side-up by student #19.

Marks in this drawing seem to be more choppy, labored and uncertain than the right-side-up drawing done by the same student in Fig.10.

Fig. 11 Drawn viewing the original up-side-down by student #19.

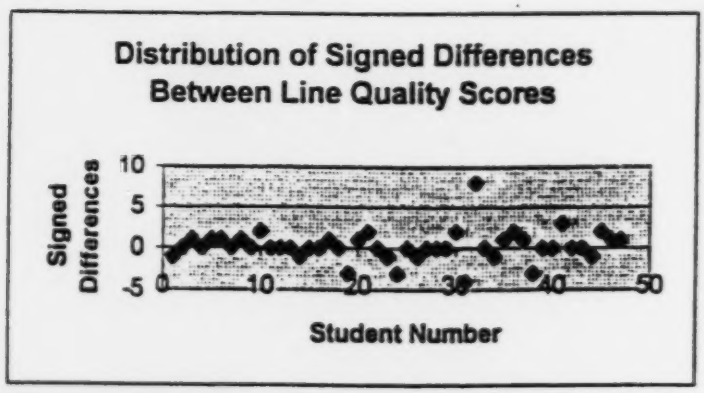
This drawing by student #31 seems more anchored because lines are connected making the portrait a more unified whole.

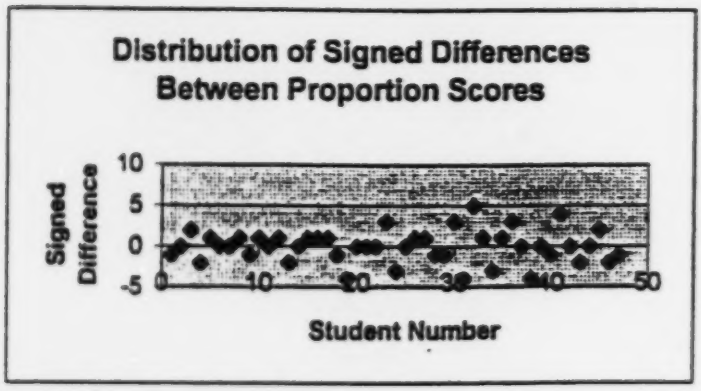
Fig. 12. Drawn viewing the original right-side-up by student #31.

Lines in this drawing seem to float around, leaving the figure disconnected. Compare this to the same student's drawing in Fig. 12.

Fig. 13. Drawn viewing the original up-side-down by student #31.

Scatter Charts of Signed Differences





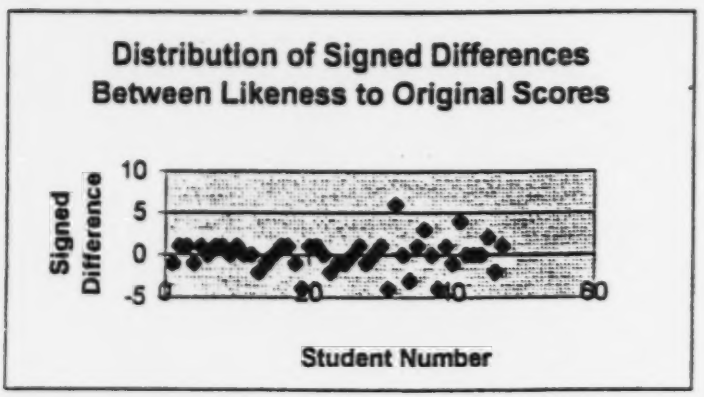


Fig. 14. Scatter graphs of signed differences for comparison purposes.